

March 20, 2006

C. N. Swenson  
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P.O. Box 388  
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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE  
OYSTER CREEK NUCLEAR GENERATING STATION, LICENSE RENEWAL  
APPLICATION (TAC NO. MC7624)

Dear Mr. Swenson:

By letter dated July 22, 2005, AmerGen Energy Company, LLC (AmerGen or the applicant) submitted to the U.S. Nuclear Regulatory Commission (NRC or the staff) an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54), to renew the operating license for Oyster Creek Nuclear Generating Station. The NRC staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete the review.

These questions were discussed with members of your staff during a conference call on February 2, 2006. A mutually agreeable date for a response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-3191 or via e-mail at [DJA1@nrc.gov](mailto:DJA1@nrc.gov).

Sincerely,

/RA/

Donnie J. Ashley, Project Manager  
License Renewal Branch A  
Division of License Renewal  
Office of Nuclear Reactor Regulation

Docket No. 50-219

Enclosure:  
As stated

cc w/encl: See next page

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Ltr. to C.N. Swenson from Donnie Ashley dated:

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Adams Accession No.: **ML060550419**

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**OYSTER CREEK NUCLEAR GENERATING STATION  
LICENSE RENEWAL APPLICATION (LRA)  
REQUEST FOR ADDITIONAL INFORMATION (RAI)**

**RAI 3.1.1-1**

(A) LRA Section 3.1.2.2.2 states that aging effects due to loss of material due to pitting and crevice corrosion in the isolation condenser will be managed by additional augmented inspections (i.e., eddy current testing (ET) of the stainless steel tubes and ultrasonic testing (UT) or visual testing (VT) of the tube sheet and channel head). During the telephone conference dated February 2, 2006, the applicant indicated that thus far no augmented inspections were performed on components associated with isolation condenser and that the proposed augmented inspections will be applicable as a part of an aging management program (AMP) during the extended period of operation. The staff requests the applicant to provide the following information so that an assessment can be made as to the effectiveness of the future augmented inspection program of the isolation condenser and its components.

- (1) Previous experience related to the frequency of occurrence of pitting and crevice corrosion in the isolation condenser and its components.
- (2) Previous inspection methods and the inspection frequency that were implemented prior to the replacement of some of the isolation condenser components.
- (3) Criteria for establishing future augmented inspection frequency.

(B) LRA Section 3.1.2.2.4(3) states that aging effects due to stress corrosion cracking (SCC) and intergranular stress corrosion cracking (IGSCC) will be managed by additional augmented inspections (i.e., ET of the stainless steel tubes and UT or VT of the tube sheet and channel head). During the telephone conference dated February 2, 2006, the applicant indicated that thus far no augmented inspections were performed on components associated with isolation condenser and that the proposed augmented inspections will be applicable as a part of an AMP during the extended period of operation. The staff requests the applicant to provide the following information so that an assessment can be made as to the effectiveness of the future augmented inspection program of the isolation condenser and its components.

- (1) Previous experience related to the frequency of occurrence of SCC and IGSCC in the isolation condenser and its components.
- (2) Previous inspection methods and the inspection frequency that were implemented prior to the replacement of some of the isolation condenser components.
- (3) Criteria for establishing future augmented inspection frequency.

**RAI 3.1.1-2**

Enclosure

Item 3.1.1-33 in LRA Table 3.1.1 indicates that the AMP for the RPV inside diameter (ID) attachment welds comply with the recommendations specified in AMP-B.1.4, "BWR Inside Diameter Attachment Welds Program." LRA AMP-B.1.4 states that the frequency and the method of inspection specified in the BWRVIP-48, "Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines" report will be implemented for the attachment welds. These guidelines apply to core spray piping bracket attachments, steam dryer support and hold down brackets, feedwater spargers, guide rod and surveillance sample holder. According to the BWRVIP-48 report Section 2.2.3, furnace-sensitized stainless steel vessel ID attachment welds are highly susceptible to IGSCC. The staff requests the applicant to identify whether there are any furnace-sensitized stainless steel attachment welds at the OCN unit, and explain what type of AMP is implemented for any existing furnace-sensitized stainless steel attachment welds. The staff also request the applicant to provide details on any additional augmented inspection program that is implemented for any existing furnace-sensitized stainless steel attachment welds at the OCN unit.

### **RAI 3.1.1-3**

(A) Item 3.1.1-36 in LRA Table 3.1.1 indicates that augmented inspection for the CRD return line weld is required in accordance with NUREG-0619, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking" at the OCN unit. NUREG-0619 recommends a periodic liquid penetrant test (PT) to evaluate the aging effect due to IGSCC in the CRD return line weld. The applicant in AMP B.1.6, "BWR Control Rod Drive Return Line Nozzle," states that it obtained approval from the staff to substitute UT for PT as a part of the augmented inspection program and this approval is valid only for the current in-service inspection (ISI) interval. Therefore, the staff requests the applicant to provide justification for continuing UT inspections in lieu of PT for the subject weld during the extended period of operation.

(B) The staff requests the applicant to provide information whether the CRD return line nozzle has been capped at the OCN unit. If the CRD return line nozzle has been capped, the staff requests the applicant to provide the following information regarding the cap and the weld:

- (1) Describe the configuration, location and material of construction of the capped nozzle. This should include the existing base material for the nozzle, piping (if piping remnants exist) and cap material, and any welds.
- (2) Describe how this weld and cap is managed in accordance with the guidelines of BWRVIP-75, "BWR Vessel and Internals Project (BWRVIP), Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedule."
- (3) Discuss whether the event at Pilgrim (leaking weld at capped nozzle, September 30, 2003) is applicable to OCN unit. The staff issued Information Notice 2004-08, "Reactor Coolant Pressure Boundary Leakage Attributable to Propagation of Cracking in Reactor Vessel Nozzle Welds" dated April 22, 2004, which states that the cracking occurred in an 182 weld that was previously repaired extensively. Discuss any plant experience with previous leakage at the capped nozzle. Include in your discussion the past inspection techniques applied, the results obtained, and mitigative strategies imposed. Provide information as to how the plant-specific experience related to this aging effect impacts the attributes specified in AMP-B.1.6.

### **RAI 3.1.1-4**

- (A) AMP B.1.5, references GE Report GE-NE-523-A71-0594, "Alternate BWR Feedwater Nozzle Inspection Requirements," which is not the Nuclear Regulatory Commission (NRC) approved version of the report. The staff requests the applicant to confirm if OCN will implement the recommendations of Revision 1, Version A of the report (GE-NE-523-A71-0594-A, Revision 1) which is approved by the staff.
- (B) The staff requests the applicant to identify whether the dissimilar metal welds of RPV nozzles, safe end components and piping have previously experienced cracking due to SCC, IGSCC or cyclic loading and the extent of cracking. The applicant should provide information regarding the extent of mitigative techniques [i.e., structural overlay, mechanical stress improvement (MSIP)] that were implemented to mitigate crack propagation due to IGSCC in the dissimilar metal welds between RPV nozzles and safe ends, and welds between safe ends and piping. In addition, the applicant should provide information on the inspection methods, sample size, and the frequency of inspections that were used thus far in these welds and the inspection results. The applicant should provide its basis for using the current inspection program as an effective AMP in monitoring the aging effect due to IGSCC in the aforementioned welds.

#### **RAI 3.1.1-5**

Item 3.1.1-43 in LRA Table 3.1.1 indicates that cast austenitic stainless steel (CASS) components are used for orificed fuel support components. The staff requests the applicant to provide the following information on this component so that assessment can be made as to its susceptibility to thermal and neutron irradiation embrittlement.

- (a) Information on type of casting (i.e., centrifugal or static)
- (b) The composition of CASS (i.e., molybdenum content and delta ferrite values)
- (c) Previous plant-specific experience regarding the cracked components and type and extent of subsequent inspection of CASS orificed fuel support components due to neutron and thermal embrittlement. The fluence values should be based on the end of the extended period of operation.

#### **RAI 3.1.2.1-1**

(A) In LRA Table 3.1.2.1.5, the applicant states that it will implement ASME Section XI, ISI program to monitor carbon steel (SA 105 Grade II) cracking in the following RPV components:

- (1) Bottom head drain nozzle;
- (2) Feedwater and main steam nozzles and safe ends;
- (3) Core spray nozzle;
- (4) Isolation condenser nozzle;
- (5) Top head nozzles;
- (6) Top head flange;
- (7) Bottom head flange;
- (8) RPV shell welds and,
- (9) Reactor head cooling.



The staff requests the applicant to provide the following information related to the subject aging effect in the aforementioned carbon steel components:

- (a) Previous plant experience related to cracking in carbon steel RPV components when exposed to treated water.
  - (b) Established mechanism of the cracking in carbon steel RPV components.
  - (c) The scope and the techniques of the past inspections, the results obtained, applied mitigative methods, repairs, frequency of the inspections and any other relevant information related to the identification of the subject aging effect.
- (B) The staff requests the applicant to address whether there was any previous plant experience related to cracking (not due to SCC or IGSCC) in carbon steel valve bodies of the reactor head cooling system, when exposed to treated water (Table 3.1.2.1.3).

#### **RAI 3.1.2.1-2**

Table IV.B1, Item IV.B1-15, of the GALL Report, Volume 2, Revision 1, recommends implementation of AMP B.1.1, "ASME Section XI, Inservice Inspection Subsections IWB, IWC, and IWD," and AMP B.1.2, "Water Chemistry," to manage aging effects due to loss of material, pitting and crevice corrosion in stainless steel and nickel-alloy materials in the reactor vessel internal (RVI) components. Since this is not included in LRA Table 3.1.2.1.4, the staff requests the applicant to address these aging effects in LRA Table 3.1.2.1.4.

#### **RAI B.1.9-1**

RAI-AMP B.1.9-1(A) - In the final safety analysis report (FSAR) Supplement A.1.9, "BWR Vessel Internals," the applicant states that the BWR vessel internals program is consistent with the BWRVIP-94, "BWR Vessels and Internals Project, Program Implementation Guideline" report. The staff requests the applicant to revise AMP B.1.9 to reference the BWRVIP-94 report, and include the following issues related to the scope of the implementation of the BWRVIP-94 guidelines in AMP B.1.9:

- (1) The applicant shall inform the staff of any decision to not fully implement a BWRVIP guideline approved by the staff within 45 days of the report.
- (2) The applicant shall notify the staff if changes are made to the RPV and its internals' programs that affect the implementation of the BWRVIP guidelines.
- (3) The applicant shall submit any deviation from the existing flaw evaluation guidelines that are specified in the BWRVIP report.

#### **RAI B.1.9-2**

The BWRVIP-76, "BWR Core Shroud Inspection and Flaw Evaluation Guidelines" and BWRVIP-104, "Evaluation and Recommendations to Address Shroud Support Cracking in BWRs" reports

are currently being reviewed by the staff. The staff requests the applicant to make a commitment that it will comply with all the recommendations that will be specified in the staff's final safety evaluations (SEs) of these reports, and that it will complete all the license renewal action items in the final SEs when they are issued.

#### **RAI B.1.9-3**

The applicant states that two leaking CRD stub tubes were repaired by using a roll expansion method which was approved by the staff on November 16, 2000, for one refuel cycle only. The applicant further states that this repair was submitted to the ASME Code in the form of a draft ASME Section XI Code Case N-730, "Roll-Expansion of Class 1 Control Rod Drive Bottom Head," for review and approval. The applicant intends to apply this repair on a permanent basis at the OCN unit when Code Case N-730 is approved by the ASME Code and the NRC. If Code Case N-730 is not approved, the applicant shall submit a permanent repair plan to the staff for review and approval two years prior to the commencement of the extended period of operation. After the implementation of an approved permanent roll repair, if there is a leak in CRD stub tubes, the applicant shall commit to immediately repair any leaking CRD stub tubes during the extended period of operation by implementing a permanent weld repair per the approved ASME Section XI Code Cases with staff conditions, if any.

The staff requests the applicant to revise AMP B.1.9 and FSAR supplement A.1.9 to commit to implementing a staff-approved permanent repair as stated above, which will result in no leakage of the CRD of the stub tubes during the extended period of operation.

#### **RAI B.1.9-4**

The applicant states that recent inspections of core spray spargers and core spray piping welds indicated that the mitigation techniques have been proven to be effective in minimizing the crack growth rates due to IGSCC in the subject components. The staff requests the applicant to provide further information on its future inspection plans which include the type and frequency of inspections, inspection methods, sample size, and inspection frequency for the repaired and non-repaired core spray components during the extended period of operation.

#### **RAI B.1.9-5**

The applicant states that recent inspections of the core shroud repair tie rods indicated that the repair techniques are effective in minimizing the crack growth rates in the subject component. The staff requests the applicant to provide information on its future inspection plans such as type and frequency of inspections and percentage of the core shroud tie rods that are currently being inspected. If the inspection sample size is not consistent with the BWRVIP-76 guidelines, the applicant should provide an explanation for this inconsistency. The staff also requests that the applicant provide its plans regarding the inspection plans (i.e., inspection methods, sample size, and inspection frequency) of non-repaired core shroud welds during the extended period of operation.

#### **RAI B.1.9-6**

The staff requests the applicant to provide information regarding the type of plugs (i.e., spring-loaded plugs or welded plugs) that were used for plugging the core plate holes at the OCN unit.

If spring-loaded core plate plugs were used at the OCN unit, the applicant should provide the type of AMP that is implemented to ensure their integrity.

**RAI B.1.9-7**

The staff requests the applicant to provide information whether any noble metal chemical application (NMCA) is applied at the OCN unit. Confirm the method of controlling hydrogen water chemistry and any NMCA as a mitigative method to reduce the IGSCC susceptibility in the RVI components. Provide details on the methods for determining the effectiveness of hydrogen water chemistry and/or NMCA by using the following parameters:

- (1) Electro Chemical Potential (ECP)
- (2) Feedwater hydrogen flow
- (3) Main steam oxygen content
- (4) Hydrogen/oxygen molar ratio.

**RAI B.1.9-8**

The staff requests the applicant to address how it will use AMP B.1.9 to monitor aging due to loss of material due to pitting and crevice corrosion and aging degradation due to SCC and IGSCC in non-safety related RVI components (i.e., steam dryer, core shroud heads and separators, internal feedwater spargers, and RPV surveillance capsule holders).

**RAI B.1.9-9**

The NRC staff has approved the applicable BWRVIP reports and attached the following required license renewal applicant action items, in accordance with 10 CFR Part 54, when incorporating the reports in a license renewal application.

The applicant is to verify that its plant is bounded by cited BWRVIP reports. Further, the applicant is to commit to programs described as necessary in the BWRVIP reports to manage the effects of aging during the period of extended operation. Applicants will be responsible for describing any such commitments and identifying how such commitments will be controlled. Any deviations from the AMPs within these BWRVIP reports described as necessary to manage the effects of aging during the period of extended operation and to maintain the functionality of the components or other information presented in the reports, such as materials of construction, will have to be identified by the applicant and evaluated on a plant-specific basis in accordance with 10 CFR 54.21(a)(3) and (c)(1).

Section 54.21(d) of the 10 CFR requires that an FSAR supplement for the facility contain a summary description of the programs and activities for managing the effects of aging and the evaluation of TLAAs for the period of extended operation. Those applicants referencing the applicable BWRVIP reports shall ensure that the programs and activities specified as necessary in the applicable BWRVIP reports are summarily described in the FSAR supplement.

Section 54.22 of the 10 CFR requires that each application include any technical specification changes (and the justification for the changes) or additions necessary to manage the effects of aging during the period of extended operation as part of the renewal application. The applicable BWRVIP reports may state that there are no generic changes or additions to technical

specifications associated with the reports as a result of the applicant's aging management review and that the applicant will provide the justification for plant-specific changes or additions. Those referencing the applicable BWRVIP reports shall ensure that the inspection strategy described in the reports does not conflict with, or result in, any changes to their technical specifications. If technical specifications changes do result, then the applicant must ensure that those changes are included in its application for license renewal.

If required by the applicable BWRVIP report, the applicant referencing a particular report for license renewal should identify and evaluate any potential TLAA issues and/or commitments to perform future inspections when inspection tooling is made available.

The staff requests the applicant to provide the necessary commitments, information and changes as described above for each of the following applicable BWRVIP reports:

BWRVIP-05, "Reactor Vessel Shell Weld Inspection Guidelines."

BWRVIP-18, "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines."

BWRVIP-25, "BWR Core Plate Inspection and Flaw Evaluation Guidelines."

BWRVIP-26, "BWR Top Guide Inspection and Flaw Evaluation Guidelines."

BWRVIP-27-A, "BWR Standby Liquid Control System/Core Plate  $\Delta P$  Inspection and Flaw Evaluation Guidelines."

BWRVIP-38, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines."

BWRVIP-47, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines."

BWRVIP-48, "Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines."

BWRVIP-49, "Instrument Penetration Inspection and Flaw Evaluation Guidelines."

BWRVIP-74-A, "BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines."

BWRVIP-75, "BWR Vessel and Internals Project (BWRVIP), Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedule."

BWRVIP-76, "BWR Core Shroud Inspection and Flaw Evaluation Guidelines."

BWRVIP-78, "BWR Integrated Surveillance Program (ISP) Plan."

BWRVIP-86, "BWR Vessel and Internals Project, BWR Integrated Surveillance Program Implementation."

Other reports applicable to license renewal.

**RAI B.1.23-1**

The staff requests the applicant to include the following statement (shown below) in the FSAR Section A.1.23, "Reactor Vessel Surveillance" of the LRA.

The applicant states that it will implement the BWRVIP integrated surveillance program (ISP) as specified in BWRVIP-116, "BWR Vessel Internals Project Integrated Surveillance Program Implementation for License Renewal" at the OCN unit. The staff is currently reviewing the BWRVIP-116 report, and if this report is not approved by the staff, the applicant must submit a plant-specific surveillance program for the OCN unit, two years prior to the commencement of the extended period of operation. The following commitment shall be included in the FSAR Section A.1.23, "Reactor Vessel Surveillance" of the LRA.

**BWRVIP ISP as specified in BWRVIP-116, "BWR Vessel Internals Project Integrated Surveillance Program Implementation for License Renewal" and approved by the staff will be implemented, or if the ISP is not approved two years prior to the commencement of the extended period of operation, a plant-specific surveillance program for the OCN unit will be submitted.**

#### **RAI B.1.23-2**

The staff requests the applicant to include the following statement (shown below) in the FSAR Section A.1.23, "Reactor Vessel Surveillance" of the LRA.

10 CFR Part 50, Appendix H, requires that an integrated surveillance program (ISP) used as a basis for a licensee implemented reactor vessel surveillance program be reviewed and approved by the NRC staff. The ISP to be used by the applicant is a program that was developed by the BWRVIP. The applicant will apply the BWRVIP ISP as the method by which the OCN unit will comply with the requirements of 10 CFR Part 50, Appendix H. The BWRVIP ISP identifies capsules that must be tested to monitor neutron radiation embrittlement for all licensees participating in the ISP and identifies capsules that need not be tested (standby capsules). Tables 2-3 and 2-4 of the BWRVIP-116 report indicate that the capsules from OCN unit are not tested. These untested capsules were originally part of the applicant's plant-specific surveillance program and have received significant amounts of neutron radiation. The following commitment shall be included in the FSAR Section A.1.23, "Reactor Vessel Surveillance" of the LRA.

**If the OCN standby capsule is removed from the RPV without the intent to test it, the capsule will be stored in a manner which maintains it in a condition which would permit its future use, including during the period of extended operation, if necessary.**